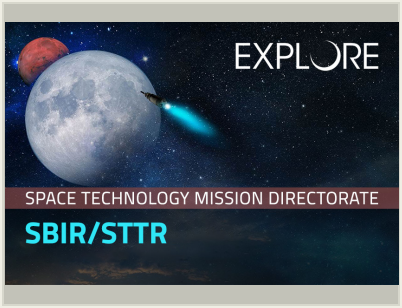
Simulator Evaluation of a Joint Human/Automated Upset Recovery System and Training Aid, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

Loss of control is a significant cause of aviation accidents attributed to a large percentage of fatalities in the commercial aviation sector. Recently, Barron Associates, Inc. (BAI) has developed a system for unmanned aerial vehicles that autonomously executes recovery strategies to rapidly restore nominal flight. During Phase I, BAI sought to extend this system to manned vehicles by developing a joint human-automated (H/A) system. The goal of this system is to assist the crew during the recovery process by conveying information about recovery procedures in an intuitive and unobtrusive manner. BAI developed crew-specific extensions to the automated system both at the architecture and interface level. The architecture defines what information is delivered to the crew. The interface defines how this information is presented to the crew. Metrics were defined to measure the quality of the recovery and crew experience. Phase I pilot-in-the-loop experiments have shown there is the potential for significant performance gains and workload reduction if the joint H/A recovery system is used to guide the pilot through the recovery process. Phase I experiments were limited in scope. During Phase II, BAI would like to build upon these results by demonstrating that gains become even more pronounced in a realistic cockpit environment. This will require migrating to a higher-quality simulator and more accurately simulating the duties of the crew. The team will target ATPs (Airline Transport Pilots) during Phase II and expand the subject population so that the benefit of the system can be explicitly quantified. While integration into the cockpit is the ultimate goal for this system, BAI believes that the joint H/A recovery system can be of immediate use as a training aid. As part of the experimental build-up, BAI would also like to show that the use of the joint H/A recovery system during training translates into improved pilot recoveries when the system is not active.



Simulator Evaluation of a Joint Human/Automated Upset Recovery System and Training Aid, Phase II

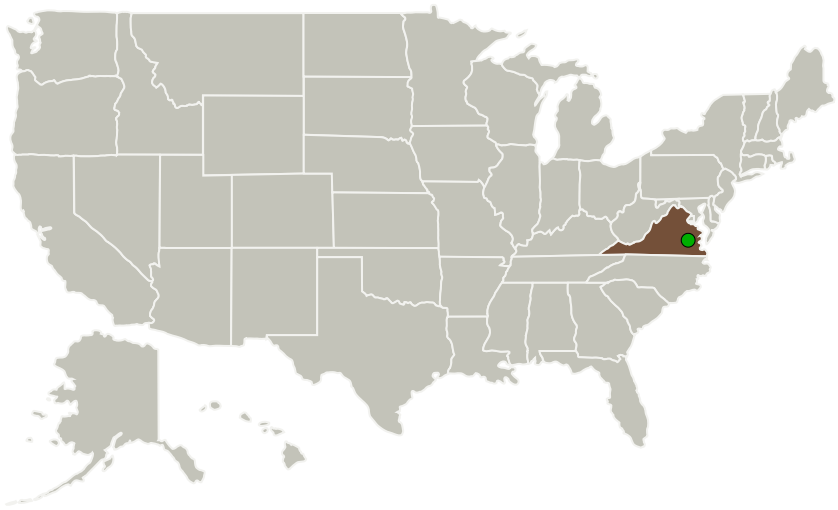
Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Simulator Evaluation of a Joint Human/Automated Upset Recovery System and Training Aid, Phase II

Completed Technology Project (2011 - 2013)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Barron Associates, Inc.	Lead Organization	Industry	Charlottesville, Virginia
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

June 2011: Project Start

May 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139452)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Barron Associates, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

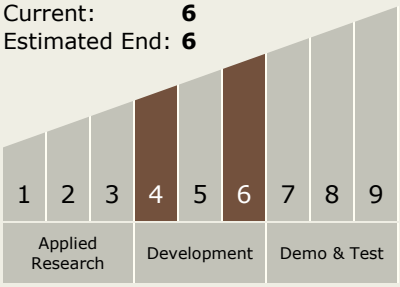
Carlos Torrez

Principal Investigator:

Richard Adams

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Simulator Evaluation of a Joint Human/Automated Upset Recovery System and Training Aid, Phase II

Completed Technology Project (2011 - 2013)

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.1 Logistics Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System